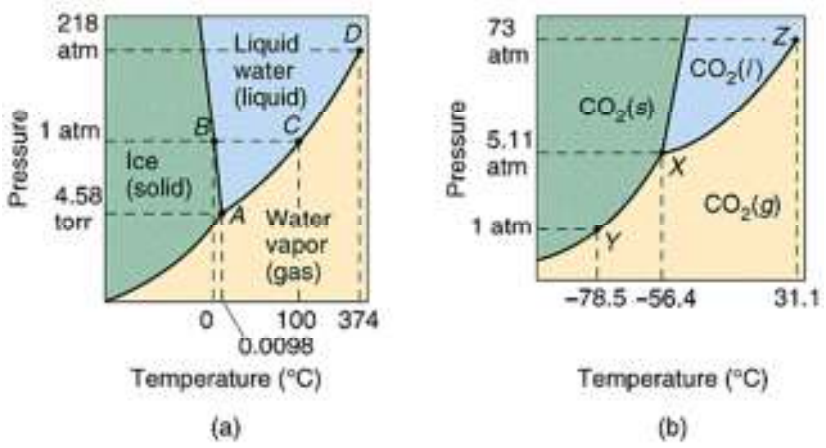
Name _____ AP Chemistry

Intermolecular Forces and Phase Diagrams

Answer these questions on a separate sheet of paper.

1) What type(s) of intermolecular forces is (are) common to:
   (a) Xe and methanol (CH_3OH)
   (b) CH_3OH and acetonitrile (CH_3CN)
   (c) NH_3 and HF
2) What type of intermolecular force accounts for the following differences in each case?
   (a) CH_3OH boils at 65°C, CH_3SH boils at 6°C.
   (b) Xe is a liquid at atmospheric pressure and 160 K whereas Ar is a gas.
3) Which member of the following pairs has the larger London dispersion forces:
   (a) H_2O or H_2S
   (b) CO_2 or CO
   (c) CH_4 or SiH_4
4) Identify the types of intermolecular forces present in each of the following substances and select the substance in each pair that has the higher boiling point:
   (a) C_6H_{14} or C_8H_{18}
   (b) HOOH or HSSH

For the following questions 5-6 use the phase diagrams below:



5) Refer to phase diagram a (for water) and describe all the phase changes that would occur in each of the following cases:
   (a) Water vapor originally at 1.0×10^{-3} atm and -0.10°C is slowly compressed at constant temperature until the final pressure is 10 atm.
   (b) Water originally at 100.0°C and 0.50 atm is cooled at constant pressure until the temperature is -10°C.

6) Refer to phase diagram b (for carbon dioxide) and describe all the phase changes (and the temperatures at which they occur) when CO_2 is heated from -80°C to -20°C at:
   (a) a constant pressure of 3 atm
   (b) a constant pressure of 6 atm
7) The normal melting and boiling points of O_2 are -218°C and -183°C, respectively. Its triple point is at -219°C and 1.14 torr and its critical point is at -119°C and 49.8 atm. Sketch the phase diagram for O_2, showing the four points given and indicating the area in which each phase is stable.